**Miles Crettien**

**Corn and “3 Sisters”** **Investigation**

**Description**

This lesson focuses on the relationship children ages 5-13 have with food, specifically corn. Students are introduced to the investigative aspects of being a food scientist through thinking about corn, the components of its kernel, and how it can get turned into three different products: corn oil, corn syrup, and corn flour.

Students are then introduced to the concept of the ancient “3 Sisters” corn bean and squash planting, through a hands on cooking demonstration, where children take part in preparing the ingredients and then cooking them all together to make “3 Sisters Tacos”.

The initial focus of this lesson is on how corn is processed and turned into its many different products that humans consume. Emphasis is put on the rise in consumption of corn syrup through its integration into many of the processed foods that we eat today. The teacher also discusses how much of the products that use corn in them today are only taking single parts of the corn and are therefore not as healthy as they would be with all parts together as it is in the whole kernel, with germ, endosperm, cavity and seed coat.

The teacher also discusses how many of these processed foods come in packaging that ends up in landfills and pollute this earth, through the burning of fossil fuels to create plastics and glass containers. Wouldn’t it be better for us and the earth to just eat the corn right off the cob?!?

The teacher then moves to the cooking demo and shows students how to make a delicious and nutritionally powerful meal through cooking with the three sisters. Discussion occurs about how what a companion planting is, and a story can be told (See methods section) to allow students to understand the relationship between the corn beans and squash more clearly. The teacher then discusses that put together, these three vegetables create a complete protein, usually only found in meat fish and dairy. Why would it be good to get protein from vegetables? What is in meat that isn’t in vegetables that might be bad for our bodies? Why is protein important for our health?

For older students - Discuss why eating vegetables is better for the planet than eating a lot of meat.Understand Energy demands of meat production**.** Understand how plants make their own energy and naturally require much less energy from us to grow. Discuss photosynthesis and potentially trophic levels.

**Grade Level, Topic, Time**

Ages vary for this lesson, and the time allotted is 45 minutes for each class. For children ages, 11-13, more of a focus can be placed on the scientific investigative portion of the class. The teacher is able to probe the children to discuss and explore the corn kernels to find out how they might turn into their three common industrial products, oil, syrup and flour. More time is taken to investigate this scientific quandary and answers are not given by the teacher so easily. More discussion takes place on how processed foods generate waste and pollution, and how it might be better for both us and the earth if we ate whole corn right off the cob.

For younger students, less of an emphasis is placed on the children working in teams to discover the relationship between how a germ might produce oil, but more on where the germ in a corn kernel is, and how it might turn into oil. The same investigation goes for the flour and syrup. Feel the flour, how does it feel, how might the inside of the kernel turn into flour? How does flour turn into syrup? What is the difference between the two, how might this happen?

**Objectives**

* Identify the relationship between a corn kernel its components and the products it creates
* Explore how the components of the corn kernel make the specific industrial components
* Understand how processed foods are made
* Discuss the effects processed foods have on our health and the health of the environment, through the waste they generate from packaging.
* Learn the ancient “3 Sisters” planting method
  + Discover the meaning of companion planting
  + Discuss each plants role in the planting
  + Understand why eating all three plants together is healthy for us
    - Point out that sometimes it healthier for us to get protein from a nonmeat source, and highlight why the “3 Sisters” are so special for this reason

**Procedure/Methods**

* Set up – prepare cutting boards on every table for each student. Place 3-4 kernels of corn on each cutting board and beside this a Corn Kernel Diagram (attached) (or use a projection image).
* Start the class discussion by telling students they are going to begin an investigation into becoming a Food Scientist
  + Ask them what a Food Scientist might do
  + What tools s/he will need?
  + What background knowledge might s/he need in order to study food?
* Have each student investigate the kernel and find all the parts described in the diagram in the kernel.
* Once they have found the different components, present them the task investigate how these components might be used to create corn oil, corn syrup and corn flour.
* Break students into 3 groups of 4-6 children in each group and have them discuss how their corn kernel might turn into one of the products.
* Allow 5-7 minutes for discussion and then have each group assign one person the task of presenting their scientific findings to the group.
* Groups that discover how their product is made are awarded with popcorn
* Once this investigation ends, begin discussion on the “3 Sisters”
* For younger children, tell the story of where the “3 Sisters” name comes from (find a story out there that already exists or make it up, be creative)
* Have students clean off their cutting boards and then pass out prepared items for chopping for the “3 Sisters” tacos we will be preparing
* Pass out equal portions of onion, tomato, garlic, and squash to be chopped by students
* Train students in safe knife handling skills before passing out nylon or other child safe knife
* Instruct students in how to cut each vegetable and which vegetable we are cutting at what time.
* Start heating olive oil on medium high heat in medium skillet
* Once cutting is complete, have each student bring up there chopped vegetables and add to oiled pan.
* Continuously stir in vegetables as children place them gently in the pan and then have children gather around the skillet.
* Show them the spices you will use, including cumin, oregano, garlic powder, salt and pepper, and allow them to smell each one ( no need for salt and pepper).
* Allow students to help stir the mixture once you have added canned corn and canned beans to the mixture by having each student come up one at a time.
* Once squash is tender, have children take a seat and have classroom assistant pass out corn tortillas.
* Elect two students to follow you while you pass out the taco filling, and add cheese and salsa if each child would like some
* Sit down together and enjoy your creation

**Assessment**

While sitting with students, ask them to recall the ingredients that went into the “3 Sisters” Tacos. Ask them which ingredients make up the “3 Sisters”, and why they are healthy for us.

Then discuss why eating the whole corn kernel is healthier for us than eating just the starch or oil. Why might we not get so much nutrition from just the starch without the germ?

Send Students home with a homework assignment: Look at home and select five different kinds of food. Have them look at the ingredient lists to see if they can identify any ingredients made from corn. They can make a simple table in the notebooks created in the class. Students are to list the ingredients they find in these items that are made from corn and bring them in for next class to discuss.

\*Note: I only see students once a month and do not need to test them, so not sure what else to write here, sorry.